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Eclipsing Binary Stars: Modeling and Analysis

Second Edition

Josef Kallrath
Eugene F. Milone



 Springer

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Eclipsing Binary Stars: Modeling and Analysis Josef Kallrath, Eugene F. Milone, 2009-08-14 Have you ever stopped at a construction project on the way to your office and the day's astrophysics? Remember the other onlookers folks just enjoying the spectacle as we all do in following developments away from our areas of active work? We are excited and thrilled when the Hubble Space Telescope discovers an Einstein Cross when the marvelous pulsars enter our lives and when computer scientists put a little box on our desk that outperforms yesterday's giant machines. We are free to make use of such achievements and we respect the imagination and discipline needed to bring them about just as onlookers respect the abilities and planning needed to create a building they may later use. After all, each of us contributes in our own areas as best as we can. In addition to the serious onlookers, there will be passersby who take only a casual look at the site. They may use the building later but have little or no interest in its construction and give no thought to the resources needed to bring it to completion. Upon arriving at work, those persons write astronomy and astrophysics books at various levels in which they must say something about close binary stars. Usually a page or two will do and the emphasis is on the MLR (mass luminosity radius) data obtained only from binaries.

Eclipsing Binary Stars Josef Kallrath, E. F. Milone, 1999 This book provides astronomers with a guide to specifying an astrophysical model for a set of observations, selecting an algorithm to determine the parameters of the model, and estimating the errors of the parameters.

Eclipsing Binary Stars: Modeling and Analysis Josef Kallrath, Eugene F. Milone, 2009-08-24 Astronomers learn much of what they know about the mass, brightness, and size of stars by observing binary systems in which two stars orbit each other periodically, cutting off the other's light. This book provides astronomers with a guide to specifying an astrophysical model for a set of observations, selecting an algorithm to determine the parameters of the model, and estimating the errors of the parameters.

Cartography of the Sun and the Stars Jean-Pierre Rozelot, Coralie Neiner, 2016-03-11 The mapping of the surface of stars requires diverse skills, analysis techniques, and advanced modeling, i.e. the collaboration of scientists in various specialties. This volume gives insights into new techniques allowing for the first time to obtain resolved images of stars. It takes stock of what has been achieved so far in Chile on the ESO VLTI instrument or in the States on the CHARA instrument. In recent times, interferometry combined with adaptive optics has allowed to reconstruct images of stars. Besides the Sun, of course, by now five stars have been resolved in detail. In addition to interferometry, this book highlights techniques used for mapping the surfaces of stars using photometry made by space observatories, Zeeman and Doppler Imaging, mapping the surface element abundances via spectroscopy. This book will also take stock of the best images of the solar surface made by connecting the differential rotation to the underlying physical parameters derived from helioseismology. Recent measurements of flattening of the solar surface by SDO showed that the Sun's shape is linked to the rotation of the core. It is shown how such a result is generalizable to the stars.

Proceedings of the 14th Arabic Conference of the Arab Union for Astronomy and Space Sciences Hamid M. K. Al

Naimiy, Hussein M Elmehdi, Ihsan A. Shehadi, 2025-05-03 This book presents peer reviewed articles from the 14th Arab Conference on Astronomy and Space Sciences AUASS held from 13-16 November 2023 at the University of Sharjah UAE. It includes recent advances in the fields of astronomy, astrophysics, space sciences and technologies including the universe and its components of celestial objects including stars, galaxies, stars, planets and the solar system. Additional topics covering earth from outer space, the physics of the sun, solar activities and their impact on the atmosphere and the environment are included. A number of chapters will be dedicated to the Arab heritage highlighting their contribution in astronomy and space sciences. This is an open access book.

Forthcoming Books

Rose Arny, 1999 Light Curve Modeling of Eclipsing Binary Stars

E.F. Milone, 1993 In the two decades since the development of the first eclipsing binary modeling code, new analytic techniques and the availability of powerful, sometimes dedicated computing facilities have made possible vastly improved determinations of fundamental and even transient stellar parameters. The scale of these developments, of course, raises questions about modeling tools, techniques and philosophies such as: Who will maintain and upgrade the codes? Will the codes be open to improvement by outsiders and if so how? And indeed, what should be the goals of a modeling program? Such questions had not been aired for a long time and for this reason alone deserved to be discussed in as general a forum as the community provides. This volume contains material presented by Commission 42, Close Binary Stars, during the International Astronomical Union's XXI General Assembly in Argentina, July 1991, and during IAU Colloquium 151, Cordoba, Argentina, August 1991. The techniques discussed include simulations of stellar bright and dark spots, streams, partial and complete stellar disks, prominences and other features characterizing active stars; modeling of polarization parameters; models that use radial velocities as well as line profile simulations to model velocity field variation across stellar disks; the weighted effects of brightness asymmetries; and models for translucent eclipsing agents such as stellar winds.

Interior Modelling of Massive Stars in Multiple Systems

Cole Johnston, 2021-05-21 This thesis by Cole Johnston brings novel insights into the inner workings of young massive stars. By bridging the observational fields of binary stars and asteroseismology, this thesis uses state-of-the-art statistical techniques to scrutinise theories of modern stellar astrophysics. Developing upon the commonly used isochrone fitting methodology, the author introduces the idea of isochrone cloud fitting in order to account for the full breadth of physics observed in stars. The author combines this methodology with gravity mode asteroseismic analysis to assess the level of chemical mixing deep within the stellar core in order to determine the star's age and core mass. Wrapped into a robust statistical framework to account for correlations, this methodology is employed to analyse individual stars, multiple systems and clusters alike to demonstrate that chemical mixing has a dramatic impact on stellar structure and evolution.

Modeling and Analysis of Eclipsing Binary Stars

Andrej Prša, 2018 The fascinating and observationally spectacular world of binary stars is a vast and beautiful one that is a significant aspect of many astrophysical studies. Modeling and Analysis of Eclipsing Binary Stars gives a comprehensive analysis and description of the science behind eclipsing binaries. It

also explores the assumptions and the difficulties that can occur when using the modeling principles of the classical codes as well as introducing PHOEBE the PHysics Of Eclipsing BinariEs a modern suite for modeling binary stars PHOEBE was conceived by Andrej Prsa and his collaborators and has become one of the standard tools in the eclipsing binary field Source rsum de l diteur **Astronomy and Astrophysics Monthly Index** ,1987 *Astronomy and Astrophysics* ,2000 *A Directory of Computer Software Applications* United States. National Technical Information Service,1979 *American Book Publishing Record* ,1999 *Subject Guide to Books in Print* ,1993 *Whitaker's Books in Print* ,1998 **Modeling and Analysis of Eclipsing Binary Stars: The Theory and Design Principles of PHOEBE** Andrej Prsa,2018-12-21 Modeling and Analysis of Eclipsing Binary Stars provides a comprehensive review of the physical and observational aspects of eclipsing binaries and the modeling code PHOEBE PHysics Of Eclipsing BinariEs that is used by a large number of researchers in this field Aimed at students researchers and astronomers this book is the foundation of knowledge for eclipsing binaries and their subsequent modeling **Physics Briefs** ,1990 *Eclipsing Binary Stars* Andrej Prsa,2018-12-21 The fascinating and observationally spectacular world of binary stars is a vast and beautiful one that is a significant aspect of many astrophysical studies Modeling and Analysis of Eclipsing Binary Stars gives a comprehensive analysis and description of the science behind eclipsing binaries It also explores the assumptions and the difficulties that can occur when using the modeling principles of the classical codes as well as introducing PHOEBE the PHysics Of Eclipsing BinariEs a modern suite for modeling binary stars PHOEBE was conceived by Andrej Prsa and his collaborators and has become one of the standard tools in the eclipsing binary field This book provides a constructive and intriguing contribution to the expansion of the modeling approaches of binaries and our subsequent understanding of the processes that govern stellar evolution Aimed at a wide audience Prsa provides new astronomers with the knowledge and background of eclipsing binary stars as well as facilitating researchers to a better understanding of the intricate details behind eclipsing binary models *INIS Atomindex* ,1984 *Index of Conference Proceedings* British Library. Document Supply Centre,1993

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